



ARL-TR-8244 • DEC 2017



Intelligent Command and Control Demonstration Setup and Presentation Instructions

by Laurel C Sadler and Somiya Metu

Approved for public release; distribution is unlimited.

NOTICES

Disclaimers

The findings in this report are not to be construed as an official Department of the Army position unless so designated by other authorized documents.

Citation of manufacturer's or trade names does not constitute an official endorsement or approval of the use thereof.

Destroy this report when it is no longer needed. Do not return it to the originator.



Intelligent Command and Control Demonstration Setup and Presentation Instructions

by Laurel C Sadler and Somiya Metu
Computational and Information Sciences Directorate, ARL

REPORT DOCUMENTATION PAGE				Form Approved OMB No. 0704-0188	
<p>Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing the burden, to Department of Defense, Washington Headquarters Services, Directorate for Information Operations and Reports (0704-0188), 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to any penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number.</p> <p>PLEASE DO NOT RETURN YOUR FORM TO THE ABOVE ADDRESS.</p>					
1. REPORT DATE (DD-MM-YYYY) December 2017		2. REPORT TYPE Technical Report		3. DATES COVERED (From - To)	
4. TITLE AND SUBTITLE Intelligent Command and Control Demonstration Setup and Presentation Instructions				5a. CONTRACT NUMBER	
				5b. GRANT NUMBER	
				5c. PROGRAM ELEMENT NUMBER	
6. AUTHOR(S) Laurel C Sadler and Somiya Metu				5d. PROJECT NUMBER	
				5e. TASK NUMBER	
				5f. WORK UNIT NUMBER	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) US Army Research Laboratory ATTN: RDRL-CII-B 2800 Powder Mill Road Adelphi, MD 20783-1138				8. PERFORMING ORGANIZATION REPORT NUMBER ARL-TR-8244	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)				10. SPONSOR/MONITOR'S ACRONYM(S)	
				11. SPONSOR/MONITOR'S REPORT NUMBER(S)	
12. DISTRIBUTION/AVAILABILITY STATEMENT Approved for public release; distribution is unlimited.					
13. SUPPLEMENTARY NOTES					
14. ABSTRACT <p>This report describes the step-by-step process for the setup and presentation of the Battlefield Information Processing Branch's Intelligent Command and Control Demonstration. The demonstration integrates applications pertaining to the basic research supporting the Information Systems Experimentation Environment. The system being demonstrated shows the integration of various sensors, analyst tools, and Internet of Things systems sharing information across the US military services (Army, Navy, Air Force, and Marines) and delivering the appropriate information to the end user. Value of Information (VoI) is used for filtering information to avoid inundating the end user with more information than necessary. The demonstration illustrates information flowing from the sensors/analyst to the end user; however, the information can also flow from the end user back to the analyst. The information from each military service is federated, since we may not need to share all information among the other military services. Federation provides interoperability between command and control (C2) systems and policies that govern information exchange within C2 systems. Examples of both VoI and federation are demonstrated.</p>					
15. SUBJECT TERMS value of information, command and control, federation, Internet of Things, information dissemination					
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT UU	18. NUMBER OF PAGES 24	19a. NAME OF RESPONSIBLE PERSON Laurel C Sadler
a. REPORT Unclassified	b. ABSTRACT Unclassified	c. THIS PAGE Unclassified			19b. TELEPHONE NUMBER (Include area code) 301-394-1221

Contents

List of Figures	iv
1. Introduction	1
2. Physical Requirements	1
3. Setup Procedure	2
4. Conclusion	12
5. References	13
Appendix. Configuration Details	15
List of Symbols, Abbreviations, and Acronyms	17
Distribution List	18

List of Figures

Fig. 1	AMX video mixer	2
Fig. 2	IHMC DSPro screen	3
Fig. 3	VMware vSphere client selection window	4
Fig. 4	172.18.30.24 – vSphere client window.....	5
Fig. 5	SOI bridge console window with federation	6
Fig. 6	DSPro Console window	7
Fig. 7	IM.....	8
Fig. 8	Terminal window	10
Fig. 9	ATAK device 1	11
Fig. 10	ATAK device 2	11

1. Introduction

This report describes the step-by-step process for the setup and presentation of the Battlefield Information Processing Branch's Intelligent Command and Control Demonstration. This demonstration was given in the Philip J Emmerman Computer Science Laboratory at the US Army Research Laboratory (ARL), Adelphi Laboratory Center (ALC), Maryland, as part of the 2017 Technical Assessment Board briefing. The demonstration integrates applications pertaining to the basic research supporting the Information Systems Experimentation Environment.

The system being demonstrated shows the integration of various sensors, analyst tools, and Internet of Things systems sharing information across the US military services (Army, Navy, Air Force, and Marines) and delivering the appropriate information to the end user. Value of Information (VoI) is used for filtering information to avoid inundating the end user with more information than necessary. The demonstration illustrates information flowing from the sensors/analyst to the end user; however, the information can also flow from the end user back to the analyst. The information from each military service is federated, since we may not need to share all information among the other military services. Federation provides interoperability between command and control (C2) systems and policies that govern information exchange within C2 systems. Examples of both VoI and federation are demonstrated.

In this demonstration, simulated data that have been federated are disseminated from the tactical operations center to 3 Android handheld devices. The first 2 handhelds represent a US Army and a US Air Force device running the Android Tactical Assault Kit (ATAK)¹ application software. The third handheld represents a US Marine device running the Kinetic Integrated Low-cost Software Integrated Tactical Combat Handheld (KILSWITCH) application software. ATAK is a mapping engine developed for Android, which allows for precision targeting, intelligence on surrounding land formations, navigation, and generalized situational awareness used by the US Air Force. KILSWITCH is a software application developed for Android tablets that provides Marines in the air and ground real-time situational awareness by using a map without having to be connected to a server.²

2. Physical Requirements

At this time, this demonstration can only be presented in the Philip J Emmerman Computer Science Laboratory at ARL-ALC. All necessary equipment for the demonstration is available at ARL.

3. Setup Procedure

This section describes each step in the setup for the Intelligent C2 Demonstration:

1. Turn on and set up monitors for the demonstration.

- a. Using the AMX video mixer, as shown in Fig. 1, select the first 3 monitor screens to display the corresponding Android devices. Select the fourth monitor screen to display the PowerPoint presentation.
 - i. Turn the center knob until the function Change appears in the window.
 - ii. Press the SELECT button.
 - iii. In the top row of INPUT buttons, select the number that corresponds to the Station number to which the handheld or laptop is connected.
 - iv. In the bottom row of OUTPUT buttons, select the number that corresponds to the monitor (1–4 left to right) that will display the handheld or computer output.
 - v. Press the TAKE button.
 - vi. Repeat steps ii–v for each input device and corresponding monitor.

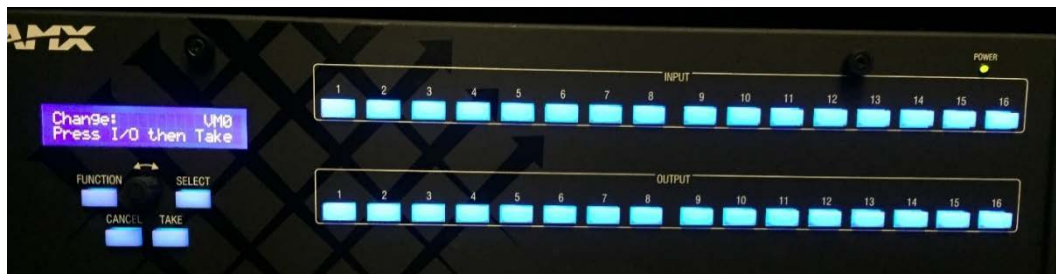



Fig. 1 AMX video mixer

2. Start the DSPro application on all Android tablets with the same session key.

- a. Click the “IHMC DSPro” icon  on the home screen.
- b. Modify the session key appropriately, as shown in Fig. 2, and press START.

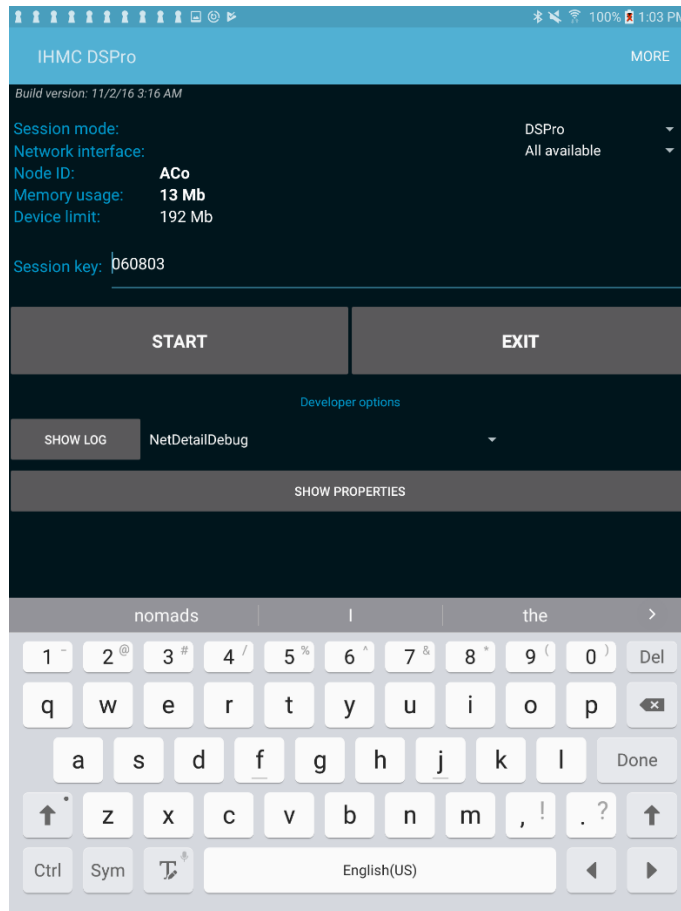



Fig. 2 IHMC DSPro screen

- c. Press the  button on the Android.

3. Set up the computer/laptop.

For a list of IP addresses for the various systems, see the ISEE configuration details in the Appendix.

- a. Double click the “VMware vSphere” icon  on the computer/laptop. The VMware Client selection window will appear as shown in Fig. 3.

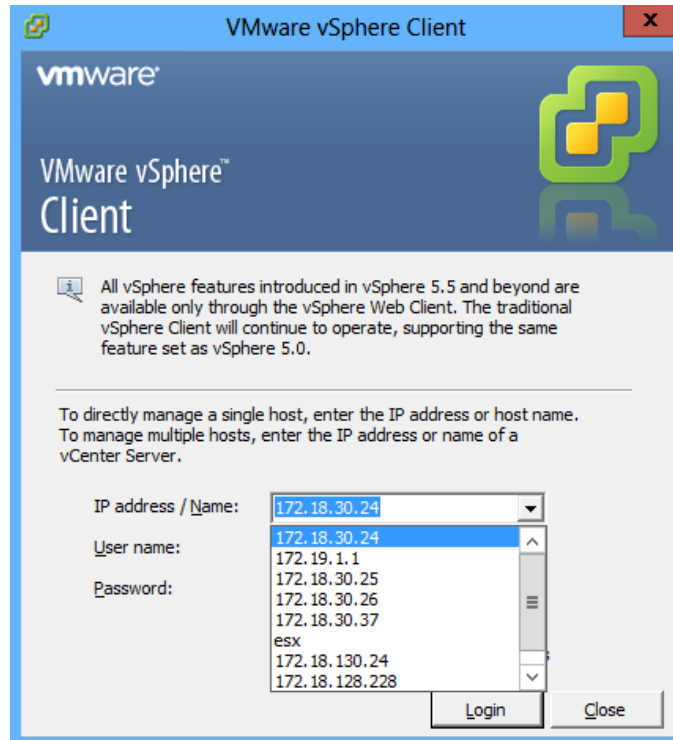


Fig. 3 VMware vSphere client selection window

- b. In the VMware vSphere Client selection window, use the dropdown menu for IP address/Name. Select 172.18.30.24 (esXi Server).
- c. Click Login. The 172.18.30.24 – vSphere Client window will appear as shown in Fig. 4.

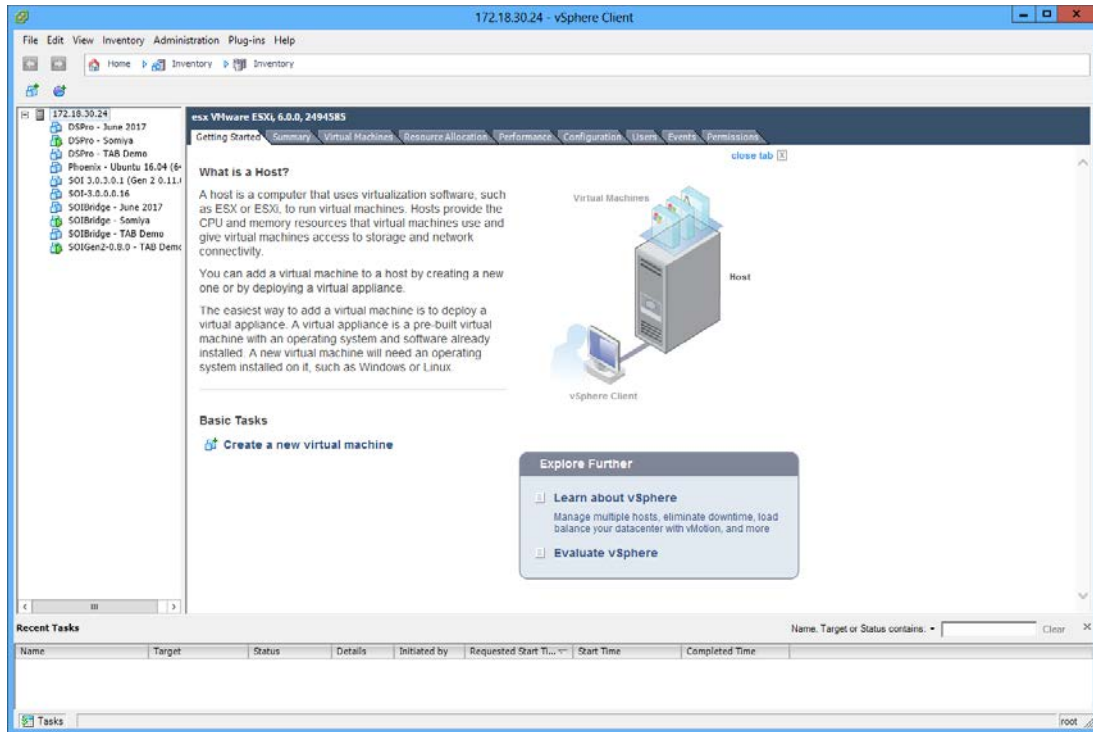


Fig. 4 172.18.30.24 – vSphere client window

4. Set up the virtual machines.

- a. In the left column of the 172.18.30.24 – vSphere Client window shown in Fig. 4, right click SOIGen2-0.8.0.
 - i. If it is not already running, select Power->Power On.
- b. In the left column of the 172.18.30.24 – vSphere Client window, right click SOIBridge.
 - i. If it is not already running, select Power->Power On.
 - ii. Right click SOIBridge->Open Console.
 - iii. The SOIBridge Console window will appear as shown in Fig. 5.

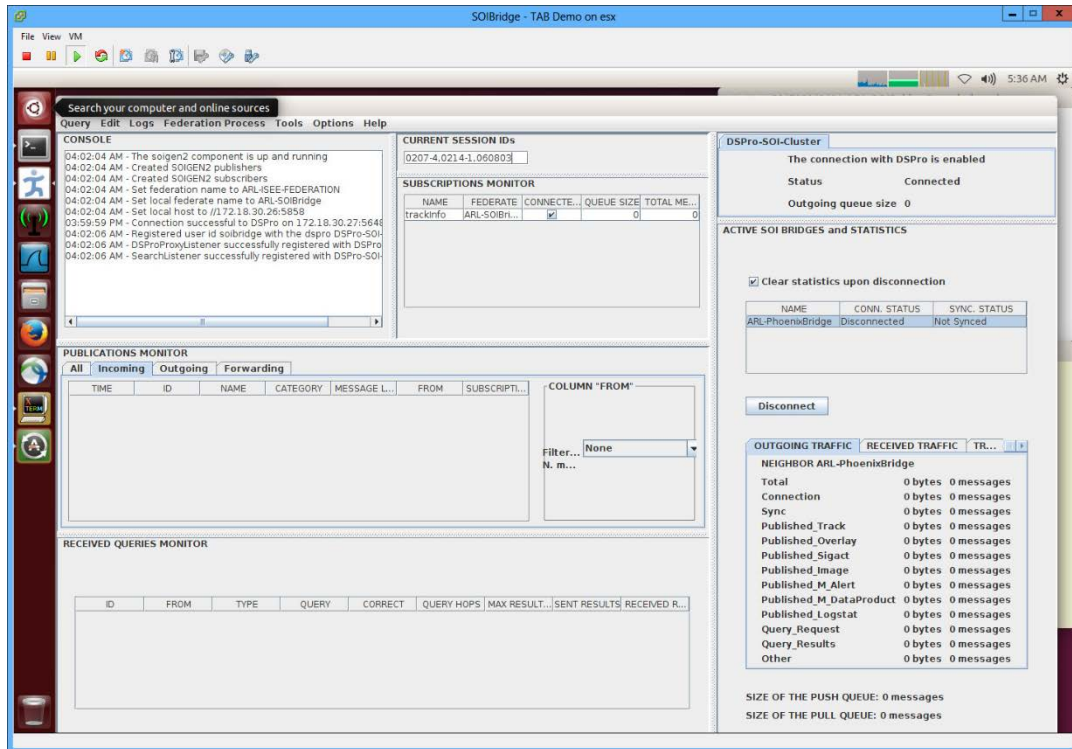


Fig. 5 SOI bridge console window with federation

- c. In the left column of the 172.18.30.24 – vSphere Client window, right click DSPro.
 - i. If it is not already running, select Power->Power On.
 - ii. Right click DSPro->Open Console. Enter the password. The DSPro console window will appear as shown in Fig. 6.

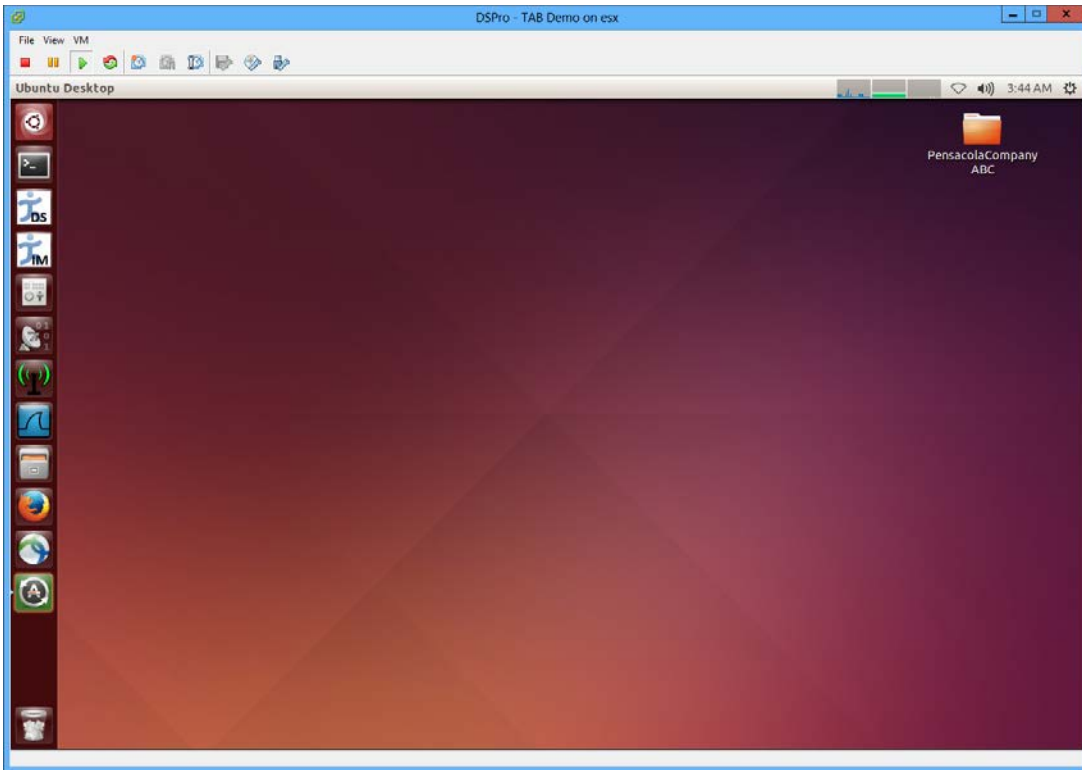




Fig. 6 DSPro Console window

5. Setup DSPro.

- a. In the DSPro VM window as shown in Fig. 6, click the “DS Pro” icon  on the left.
- b. Modify the session key to match with the session keys of DS Pro applications running on the Android tablets. (Note: It does not make a difference if one starts DSPro on the server or on Android devices first. Order does not matter.)
- c. Click the Start DSPro button.

6. Setup Information Manager (IM).

- a. In the DSPro VM window as shown in Fig. 6, click the IM icon  on left. (Note: If DSPro has been started on the tablets, then a list of peers should appear in the IM Window that runs on the server. If the list of peers does not appear in the IM Window, start DSPro on the tablets. See Section 2).
- b. In the IM window, verify if all 3 peers (Company A, B, and C) are visible in the List of Active Peers on the right as shown in Fig. 7.

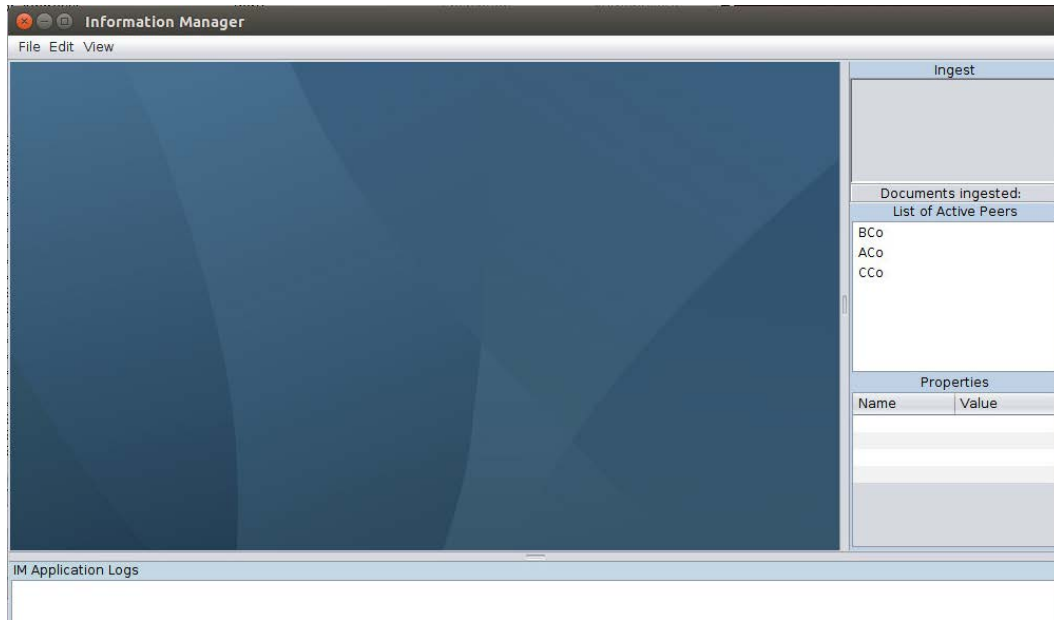


Fig. 7 IM

7. Start ATAK on the 2 Android devices and KILSWITCH on third Android device.

a. ATAK:




- i. Click the “ATAK” icon on the home screen.

b. KILSWITCH:



- i. Click the “KILSWITCH” icon on the home screen.
- c. On both the ATAK and KILSWITCH applications, set up the map view:**
- i. Zoom to 2.8 around the Pensacola airport; it looks like a plus (+) sign.

8. Start the federation monitor on the computer/laptop.


- a. In the SOI Bridge Console window as shown in Fig. 5, click the “Federation” icon  to start the federation monitor. The Federation window will appear as shown in Fig. 5.

- b. Click Federation Process in the top menu bar:
 - i. Select Start Federation Locally.
 - ii. Modify the session key to match the session keys of DSPro applications running on the Android tablets.
 - iii. Click OK.


9. Connect DSPro on the Android devices.

- a. Do the following on the Android devices running ATAK:
 - i. Click menu.
 - ii. Select DSPro Tool.
 - iii. Select Connect To DSPro.
- b. This is not necessary on the KILSWITCH device.

10. Select the routes on the Android devices.

- a. Select Menu:
 - i. Select DSPro Tool.
 - ii. Click Submit Route button.
 - iii. Select Company A Company Pensacola, B Company Pensacola for ATAK, and C Co - Pensacola for KILSWITCH.
 - iv. Select .
 - v. The routes should appear on the map.

11. Run the prefabricated demonstration scripts on the computer.

- a. Return to SOIBridge Console.
 - i. Click on the terminal icon . The terminal window will appear as shown in Fig. 8.

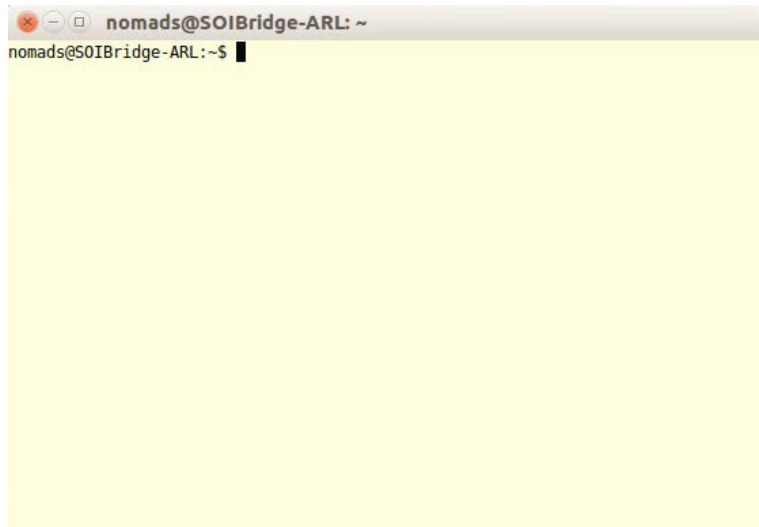


Fig. 8 Terminal window

- ii. In the terminal window, type `cd IHMC/code/federation/tools/SOIGen2-clients/scripts` and hit the return key to change to the correct directory.
- iii. Type `./runPensacolaScenario.sh`.
 1. Hit return to start the scenario.

12. Send the data.

- a. Return to IM Window in the DSPro Console.
 - i. Click File->Ingest...
 - ii. Select Desktop, open the folder PensacolaCompanyABC, select all (ctrl+a), and click open.
- b. Select “No” for Do you want to edit Metadata? The data will be sent.
- c. Then the documents will appear on the ATAK and KILSWITCH devices as shown in Figs. 9 and 10.

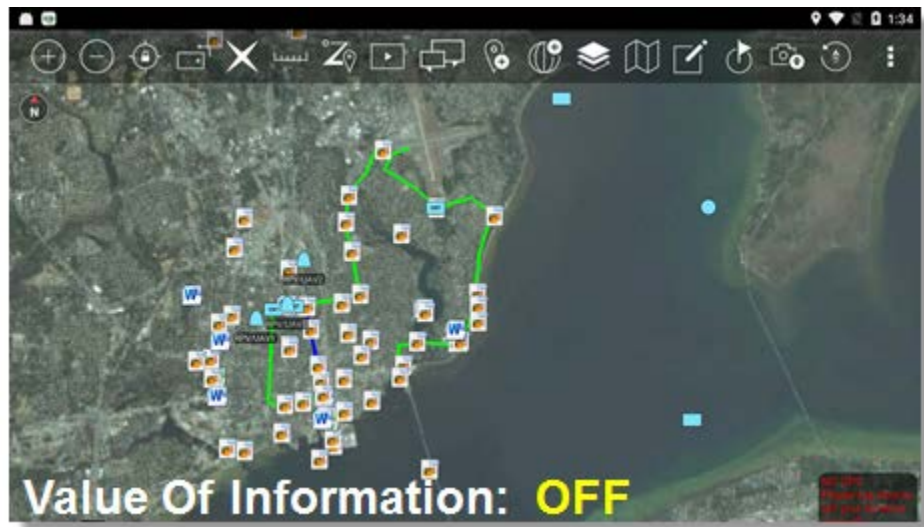


Fig. 9 ATAK device 1

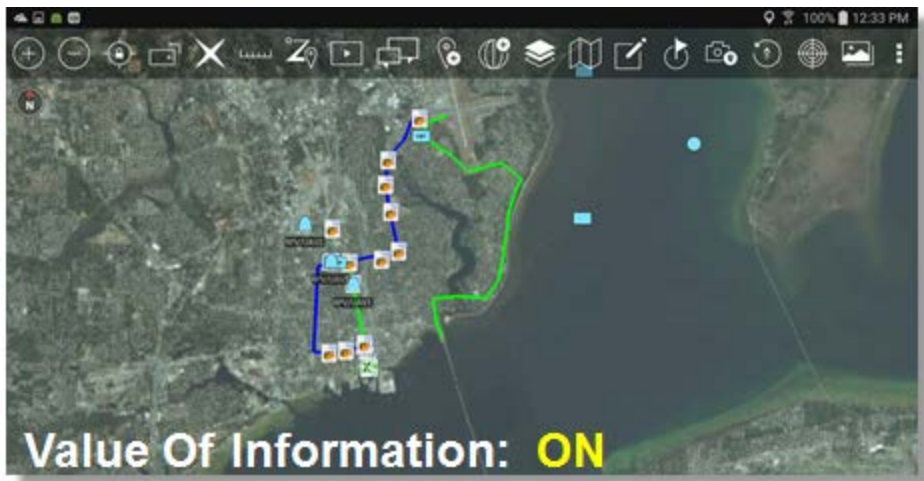





Fig. 10 ATAK device 2

13. Take a photo for the “live” demonstration.

- a. Return to the KILSWITCH Android device.
- b. Select Menu:
 - i. Select DSPro plugin.
 - ii. Select Take Picture Observation.
 - iii. Enter a title.
 - iv. Select .

- v. Enter Lat: 30.468975. Select .
- vi. Enter Lon: -87.162994 Select .
- vii. Click the Camera icon in the lower right corner.
- viii. Select Take Photo.
- ix. Aim and select the Camera icon.
- x. Select OK.
- xi. Select Confirm and send to DSPRO.

14. View the photo on Android A.

- a. Select the image on the map on Android A.
- b. Select DSProDataViewer.
- c. The image should appear.
 - If “Waiting for Data” appears on the screen, click REFRESH.

15. View the image for “chunking” on the Android device.

- a. Return to Company B Android device.
- b. Select an image on the ATAK map.
- c. Select DSProDataViewer.
- d. Click Select.
- e. Enclose a section of the image in which to enhance the definition using the rectangle.
- f. Select Request.
- g. That section of the image should appear in high resolution.

4. Conclusion

The Intelligent C2 Demonstration continues to be enhanced with the addition of new research capabilities as they become available. This report described all the steps required to present the demonstration in its current state. This document will need to be updated as new capabilities are added.

5. References

1. Android Windows Tactical Assault Kit. Wright-Patterson Air Force Base (OH): Air Force Research Laboratory (US); 2017 [accessed 2017 Nov]. <https://atakmap.com/>.
2. Staten D Lance Cpl. Marines use tablet technology to advance war fighting skills. Arlington (VA): Marine Corps (US); 2015 Oct 19 [accessed 2017 Nov]. <http://www.marines.mil/News/News-Display/Article/624674/marines-use-tablet-technology-to-advance-war-fighting-skills/>.

INTENTIONALLY LEFT BLANK

Appendix. Configuration Details

ISEE Configurations Details

Network: 172.18.30.1-63

Netmask: 255.255.255.192

Default Gateway: 172.18.30.1

DNS Server: 172.18.30.10

DNS and DHCP servers are running on mule01, which is also 172.18.30.10

WiFiAccessPoint: 172.18.30.7

WiFi SSID: fresca2 and fresca5

WiFi Password:

DHCP Range: 172.18.30.40 to 172.18.30.60

Two ESXi Servers:

esXi1 – 172.18.30.24

esXi2 – 172.18.30.25

VMs

SOIBridge: 171.18.30.26

DSPro: 171.18.30.27

Soi: 172.18.30.36

Soi2: 172.18.30.37

Phoenix: 172.18.30.38

PhoenixBridge: 172.18.30.39

SOIBridge-AB17: 172.18.30.44

SOI2AB17: 172.18.30.51

DSPro-ab17:172.18.30.45

List of Symbols, Abbreviations, and Acronyms

ARL	US Army Research Laboratory
ALC	Adelphi Laboratory Center
VoI	value of information
C2	command and control
ATAK	Android Tactical Assault Kit
KILSWITCH	Kinetic Integrated Low-cost Software Integrated Tactical Combat Handheld

1 DEFENSE TECHNICAL
(PDF) INFORMATION CTR
DTIC OCA

2 DIR ARL
(PDF) IMAL HRA
RECORDS MGMT
RDRL DCL
TECH LIB

1 GOVT PRINTG OFC
(PDF) A MALHOTRA

5 DIR ARL
(PDF) RDRL CII B
S RUSSELL
A RAGLIN
L C SADLER
S METU
T GREGORY